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RISK FACTORS FOR NON-COMMUNICABLE DISEASES IN UNIVERSITY STUDENTS

Fatores de risco para doenças crônicas não transmissíveis em universitários

Factores de riesgo para enfermedades crónicas no transmisibles en universitarios

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ABSTRACT

Objective: To check the changes in university students' lives one year after university admission and their relationship to risk factors for non-communicable diseases. **Methods:** Cross-sectional study carried out in 2015 with 47 university students in Ituiutaba, Minas Gerais, Brazil. A semi-structured and self-administered questionnaire was used to address sociodemographic data, life habits, clinical aspects of diabetes mellitus, systemic high blood pressure, obesity and quality of sleep. Additionally, blood samples were collected for the analysis of the biochemical profile and anthropometric and blood pressure measurements were performed. **Results:** Of the participants, 64% (n=20) were women, 53% (n=25) were white and 55% (n=26) were aged 18 and 19 years. Over one year there was an increase in the prevalence of physical activity, which improved blood pressure, high density lipoprotein (HDL) cholesterol and quality of sleep. Additionally, there was a decrease in increased and considerably increased waist circumference of 6.4% (n=3) and a decrease in the waist-hip ratio of students of 21.2% (n=10). The frequency of stress, depression and anxiety also decreased. On the other hand, there were increases in the prevalence of pre-obesity in 6.4% (n=3), use of alcohol in 6.4% (n=3), use of tobacco in 10.6% (n=5) and use of illegal drugs in 8.5% (n=4) of the participants. **Conclusion:** The frequency of risk factors for noncommunicable diseases in the university students analyzed decreased one year after admission.

Descriptors: Quality of life; Hypertension; Obesity.

RESUMO

Objetivo: *Verificar as mudanças ocorridas na vida de estudantes universitários após um ano de ingresso no meio acadêmico e a sua relação com fatores de risco para doenças crônicas não transmissíveis.* ***Métodos:*** *Estudo transversal realizado em 2015, com 47 universitários, em Ituiutaba, Minas Gerais, Brasil. Aplicou-se questionário semiestruturado, autorresponsivo, com questões sobre dados sociodemográficos, hábitos de vida, aspectos clínicos de diabetes mellitus, hipertensão arterial sistêmica, obesidade e qualidade do sono. Além disso, coletaram-se amostras de sangue para análise do perfil bioquímico, além de medidas antropométricas e pressão arterial.* ***Resultados:*** *Encontrou-se prevalência de 64% (n=20) do sexo feminino, 53% (n=25) do grupo étnico racial branco e 55% (n=26) da faixa etária entre 18 e 19 anos. No decorrer de um ano, observou-se aumento na prevalência de prática de atividade física, refletindo na melhora da pressão arterial, na fração de colesterol de alta densidade (HDLc) e na qualidade do sono. Além disso, houve diminuição de 6,4% (n=3) tanto na circunferência da cintura aumentada quanto na circunferência da cintura substancialmente aumentada e diminuição de 21,2% (n=10) na relação cintura-quadril dos estudantes. A frequência de estresse, humor deprimido e ansiedade também apresentaram redução. Em contrapartida, aumentou a prevalência de pré-obesos em 6,4% (n=3), de uso de bebidas alcoólicas em 6,4% (n=3), de tabaco em 10,6% (n=5) e de drogas ilícitas em 8,5% (n=4).* ***Conclusão:*** *Percebeu-se uma diminuição na frequência de fatores de risco para doenças crônicas não transmissíveis nos estudantes universitários investigados após um ano de curso.*

Descritores*: Qualidade de vida; Hipertensão; Obesidade.*

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RESUMEN

Objetivo: *Verificar los cambios en la vida de los estudiantes universitarios después de un año de ingreso en el ambiente académico y su relación con los factores de riesgo para las enfermedades crónicas no transmisibles.* ***Métodos:*** *Estudio transversal realizado en 2015 con 47 universitarios de Ituiutaba, Minas Gerais, Brasil. Se aplicó un cuestionario semiestructurado y auto aplicable con cuestiones sobre los datos sociodemográficos, los hábitos de vida, los aspectos clínicos de diabetes mellitus, la hipertensión arterial sistémica, la obesidad y la calidad del sueño. Además, se recogieron muestras de sangre para el análisis del perfil bioquímico además de las medidas antropométricas y de la presión arterial.* ***Resultados:*** *Se encontró la prevalencia del 64% (n=20) para el sexo femenino, el 53% (n=25) para el grupo étnico racial blanco y el 55% (n=26) para la franja de edad entre los 18 y 19 años. Durante un año se observó el aumento de la prevalencia de práctica de actividad física lo que refleja en la mejora de la presión arterial, la fracción de colesterol de alta densidad (HDLc) y en la calidad del sueño. Además, hubo disminución del 6,4% (n=3) en la circunferencia de la cintura aumentada y la circunferencia de la cintura sustancialmente aumentada y diminución del 21,2% (n=10) en la relación cintura-cuadril de los estudiantes. La frecuencia del estrés, el humor deprimido y la ansiedad también han tenido reducción. De otro lado, aumentó la prevalencia de pre-obesos en el 6,4% (n=3), de uso de bebidas alcohólicas en el 6,4% (n=3), de tabaco en el 10,6% (n=5) y de drogas ilícitas en el 8,5% (n=4).* ***Conclusión:*** *Se percibió una disminución de la frecuencia de los factores de riesgo para las enfermedades crónicas no transmisibles en los estudiantes investigados después de un año de curso.*

Descriptores*: Calidad de Vida; Hipertensión; Obesidad.*

INTRODUCTION

Noncommunicable diseases (NCDs) are non-infectious and irreversible and have a multicausal origin since they have a prolonged duration, a long latency period and because they generate functional disability[1]. NCDs still depend on the genetic factor and the time of exposure of the individual to the causative agent[2].

Brazil has been presenting changes in its population's mortality profile, with an increase in the number of deaths caused by NCDs[3]. The World Health Organization (WHO) revealed in 2010 that 36 million (63%) of global deaths were caused by NCDs, and that this number could rise to 44 million between 2010 and 2020 – an increase of 15%[4]. In Brazil, NCDs account for 72% of all deaths, most of which occur prematurely, i.e., before the age of 70[5].

Systemic arterial hypertension (SAH) is considered one of the most important public health problems due to its high prevalence and low control rates; in addition, it is the main risk factor for complications such as stroke, acute myocardial infarction (AMI) and chronic end-stage renal disease[6]. The prevalence of the disease is a worrying factor, since it is constantly increasing. One billion people are currently affected by SAH worldwide[7]. In Brazil alone, the disease prevalence rate is on average 32.5%, with higher rates among men (35.8%) compared with women (30%)[8].

Individuals with diabetes mellitus (DM) are at increased risk for hypertension[9]. Brazil has the 4th highest prevalence of DM worldwide[10]. In 2014, the International Diabetes Federation reported a prevalence rate of 8.7% of DM in Brazilian adults aged 20 to 79 years, but in 2015 this number rose to 10.2%, corresponding to 14.2 million cases[11]. Given such increase, DM, particularly type 2 (DM2), represents a worldwide epidemic and a public health problem, requiring high investments in treatment, recovery and maintenance. DM2 alone accounts for more than 25% of the world's health spending and has been increasingly affecting individuals at younger ages, mainly due to the increase in obesity levels and physical inactivity among young people[10,12].

In addition to hypertension and DM, the prevalence of overweight has also increased among adolescents in recent years[13]. Currently, 20.5% of the population is overweight and 4.9% is obese. With regard to the adult population aged over 20 years, 49% is overweight and 14.8% is obese[14].

The prevalence of dyslipidemias is twice as high in obese individuals with a body mass index (BMI) greater than or equal to 35 kg/m^2[15]. In addition, it is estimated that high cholesterol causes an average of 2.6 million deaths every year. In 2008, adult hypercholesterolemia had a worldwide prevalence of 39%, with a 37% rate for men and a 40% rate for women[16].

Obesity, hypertension, DM, and dyslipidemias are diseases that are correlated and have common risk factors, such as age, family history, social inequality, low levels of education, poor access to information and services[17], and other behavioral factors such as unhealthy eating, sedentary lifestyle, smoking, harmful alcohol consumption, sleep disorder and certain disorders, including poor management of stress, anxiety and depression[2].

Many of these risk factors are aggravated or emerge during the academic years as university admission may cause several changes in the life of a student. This new phase implies a different routine that leads to the adoption of a new lifestyle, which can often result in unhealthy habits that may endanger the health of the student[18]. On the other hand, university students are great knowledge builders and disseminators; therefore, the provision of information on the risk factors for NCDs and their prevention can contribute to the promotion of quality of life and to the reduction of the occurrence of these diseases[19].

Given that, the present study aimed to check the changes in university students' lives one year after university admission and their relationship to risk factors for non-communicable diseases.

METHODS

We carried out a prospective epidemiological study with 47 university students of both genders from the city of Ituiutaba (Minas Gerais, Brazil) between June 2015 and July 2016. Students were informed about the procedures and possible benefits and risks related to the participation in the study. The study included the students who met the following criteria: age over 18 years, regular admission, adequate completion of the research instruments and voluntary participation in the study.

Sociodemographic, epidemiological and lifestyle data were collected using an author-developed self-administered semi-structured questionnaire with questions addressing: sociodemographic data; personal and health information (origin, length of residence in the city, age, gender and ethnic-racial group); life habits and risk factors (quality of diet); use of medications, illicit drugs, alcohol and tobacco; quality of sleep; behavioral disorders; regular physical activity; and clinical aspects (self-reported diagnosis and family history of DM, SAH and obesity).

Body weight was measured with students standing at the center of the platform of the G Tech Glass 200® digital portable scale with their feet together and arms along the body. Height was measured using a measuring tape with a precision of 0.5 centimeters in a vertical position on a wall. The student should stand straight barefoot with feet together and close to the scale, as recommended by the Handbook of Anthropometry. The values obtained were used to determine the Body Mass Index (BMI) by dividing the weight in kilos by the square of height in meters[20].

Waist circumference (WC) was measured using an inextensible measuring tape (0.5 cm accuracy) placed at the midpoint between the iliac crest and the last lower rib without pressure, with the student standing straight with arms alongside the body in the expiratory phase of breathing. Hip circumference (HC) was also measured using an inextensible measuring tape (0.5 cm accuracy) placed at the region of greater prominence of the hip without compressing the skin[21]. Waist-to-hip ratio (WHR) was measured using WC and HC measures (WC/HC). The reference values for BMI and WC were classified according to the criteria recommended by the World Health Organization[22], and the WHR values were classified based on reference guidelines[21].

Blood pressure was measured using G Tech® and Medeqco® digital pulse sphygmomanometers regularly calibrated and following the recommendations of the VI Brazilian Hypertension Guidelines[8]. Students were instructed to present with an empty bladder and not to exercise for at least 60 minutes prior to measurement; in addition, they were told not to drink alcoholic beverages, coffee or food containing these substances in the last 24 hours and not smoke within 30 minutes prior to measurements. Blood pressure was measured with the student seated, legs uncrossed, feet flat on the floor, back relaxed and supported on the chair[8]. The student should rest the arm at heart level with palm faced up and elbow slightly flexed. The student was kept at rest for at least 5 minutes and blood pressure was measured in triplicates with a one-minute interval between them. The mean value of the two measurements with the closest values was considered for analysis. Reference values proposed in the guidelines of the Brazilian Society of Cardiology[8] were followed.

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), validated for Brazil[23]. This questionnaire is composed of ten questions distributed in seven components that are assessed according to the distribution of a score of zero to three points for each component in order to analyze the quality of sleep in the last month. The PSQI allows the analysis of subjective quality of sleep, its latency, duration, habitual efficiency, disturbances, use of sleeping medication and daytime dysfunction. The sum of the seven components generates a global PSQI score with a maximum score of 21 points. Scores below 5 points indicate good quality of sleep, scores above 5 points shows indicate poor quality of sleep, and scores above 10 points suggest sleep disorders[23].

For the analysis of the glycemic and lipid profiles, the students were instructed to remain fasting for 12 hours, not to perform physical effort in the last 24 hours and not to consume alcoholic beverages for 72 hours before blood collection, following the recommendations of the V Brazilian Guidelines on Dyslipidemia and Prevention of Atherosclerosis[24]. 10 mm of blood were collected by venipuncture, and the biochemical measurement of glucose, total cholesterol (TC), triglycerides (TG) and high-density cholesterol fraction (HDLc) was performed using LabTest Diagnóstica S/A diagnostic kits. The concentration of low density cholesterol (LDLc) was determined using the Friedewald formula: $LDL\text{-}_C = CT - (HDL\text{-}_C + TG/5)$[24]. The reference values recommended by the Brazilian Society of Cardiology[24] and the Brazilian Society of Diabetes[9] were adopted.

The data were tabulated using Microsoft Office Excel 2010® and then submitted to descriptive analysis considering the total sample for the determination of means, standard deviations and absolute (n) and relative (%) frequencies. Anthropometric and clinical data were correlated with age, gender, family history of diseases, ethnic-racial groups, quality of diet, regular physical activity, use of supplementary foods, medications, illicit drugs, alcohol and tobacco using BioEstat version 5.0.

The students who met the previously established criteria signed the Free and Informed Consent Form approved by the Human Research Ethics Committee of the Federal University of Uberlândia (*Universidade Federal de Uberlândia*) under Approval No. 006553/2015.

RESULTS

The sample consisted of 47 students. Of these, 64% (n=20) were women, 53% (n=25) were White and 55% (n=26) were between 18 and 19 years old, with a mean age of 21.60 ± 4.40. In all, 47% (n=22) and 45% (n=21) of the study participants were from the states of São Paulo and Minas Gerais, respectively. In addition, 64% (n=30) have been living in the city of Ituiutaba for less than a year, as shown in Table I.

Table I - Sociodemographic profile of university students. Ituiutaba, Minas Gerais, Brazil, 2016.

Variables	n	%
Gender		
Women	30	64%
Men	17	36%
Age		
18-19	26	55%
20-30	19	41%
31-38	02	4%
Ethnic-racial group		
Yellow	02	4%
White	25	53%
Black	14	30%
Pardo	06	13%
Origin (state)		
São Paulo	22	47%
Rio de Janeiro	2	4%
Minas Gerais	21	45%
Tocantins	01	2%
Mato Grosso	01	2%
Length of residence in Ituiutaba		
< 1 year	30	64%
1-5 years	02	4%
> 5 years	15	32%

n: sample size; %: sample percentage.

Table II shows that 23.4% (n=11) of the students had optimal BP, and in 2016 this number rose to 66.0% (n=31). In addition, there were decreases in the frequencies of: normal BP, which decreased from 12.8% (n=6) to 6.4% (n=3); borderline BP, which decreased from 25.5% (n=12) to 14.9% (n=7); stage 1 hypertension, which decreased from 19.2% (n=9) to 4.3% (n=2); stage 2 hypertension, which decreased from 8.5% (n=4) to 2.1% (n=1); and isolated hypertension, which decreased from 10.6% (n=5) in 2015 to 6.3% (n=3) in 2016.

In 2015, there was a higher prevalence of borderline BP among women, which corresponds to 36.7% (n=11). Men presented a higher prevalence of normal BP, represented by 35.3% (n=6). One year after admission, both men and women presented higher prevalence rates of optimal BP – 76.7% (n=23) for women and 47.1% (n=8) for men.

Table II - Systemic arterial hypertension among university students stratified by year and gender. Ituiutaba, Minas Gerais, Brazil, 2016.

Blood pressure (BP)	2015			2016		
	Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)	Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)
Optimal BP [SBP < 120 mmHg; DBP < 80 mmHg]	9 (30.0)	2 (11.8)	11 (23.4)	23 (76.7)	8 (47.1)	31 (66.0)
Normal BP [SBP 120-129 mmHg; DBP 80- 84 mmHg]	0 (0.0)	6 (35.3)	6 (12.8)	1 (3.3)	2 (11.8)	3 (6.4)
Borderline BP [SBP 130-139 mmHg; DBP 85-89 mmHg]	11 (36.7)	1 (5.9)	12 (25.5)	5 (16.7)	2 (11.8)	7 (14.9)
Hypertension (stage 1) [SBP 140-159 mmHg DBP 90-99 mmHg]	5 (16.7)	4 (23.5)	9 (19.2)	1 (3.3)	1 (5.9)	2 (4.3)
Hypertension (stage 2) [SBP 160-179 mmHg; DBP 100-109 mmHg]	4 (13.3)	0 (0.0)	4 (8.5)	0 (0.0)	1 (5.9)	1 (2.1)
Isolated hypertension [SBP ≥ 140 mmHg; DBP < 90 mmHg]	1 (3.3)	4 (23.5)	5 (10.6)	0 (0.0)	3 (17.6)	3 (6.3)
Mean	124/83	129/79	125/81	112/70	125/73	116/72
SD	±13.9	±11.3	±13.1	±11.0	±16.7	±13.8

SBP: systolic blood pressure; DBP: diastolic blood pressure; n: sample size; %: sample percentage. Reference values according to the Brazilian Society of Cardiology (2010).

There was a positive correlation between BMI and BP, i.e., individuals with high BMI had a 66% (r=0.66) increase in the chance of presenting high SBP and DBP. In addition, students' BP improved from 2015 to 2016, with an ideal weight frequency decrease from 55.3% (n=26) to 48.9% (n=23), which influenced the increase in the frequency of overweight. Nevertheless, the frequency of increased WC decreased from 51.1% (n=24) to 44.7% (n=21). The frequency of substantially increased WC also decreased from 29.8% (n=14) to 23.4% (n=11). The frequency of WHR also decreased – from 57.4% (n=27) to 36.2% (n=17) – one year after admission, as depicted in Table III.

Table III - Anthropometric measures of university students stratified by year and gender. Ituiutaba, Minas Gerais, Brazil, 2016.

Anthropometric parameters	2015			2016		
	Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)	Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)
BMI						
Underweight (< 18.5 kg/m²)	6 (20.0)	1 (5.9)	7 (14.9)	5 (16.7)	2 (11.8)	7 (14.9)
Ideal weight (18.5-24.9 kg/m²)	14 (46.7)	12 (70.6)	26 (55.3)	12 (40.0)	11 (64.7)	23 (48.9)
Overweight (≥ 25.0 kg/m²)	10 (33.3)	4 (23.5)	14 (29.8)	13 (43.3)	4 (23.5)	17 (36.2)
Pre-obesity (25.0-29.9 kg/m²)	7 (23.3)	3 (17.6)	10 (21.3)	10 (33.3)	3 (17.6)	13 (27.7)
Class I obesity (30.0-34.9 kg/m²)	2 (6.7)	1 (5.9)	3 (6.4)	2 (6.7)	1 (5.9)	3 (6.4)
Class II obesity (35.0-39.9 kg/m²)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Class III obesity (≥ 40.0 kg/m²)	1 (3.3)	0 (0.0)	1 (2.1)	1 (3.3)	0 (0.0)	1 (2.1)
Mean	23.9	23.7	23.8	24.1	23.8	24.0
SD	±5.5	±3.6	±4.9	±5.7	±3.7	±5.0
Inadequate WC						
Increased						
Men: ≥ 94 cm		5 (29.4)	24 (51.1)		4 (23.5)	21 (44.7)
Women: ≥ 80 cm	19 (63.3)			17 (56.7)		
Substantially increased						
Men: ≥ 102 cm		3 (17.6)	14 (29.8)		2 (11.7)	11 (23.4)
Women: ≥ 88 cm	11 (36.7)			9 (30.0)		
Mean	85.6	87.4	86.3	83.3	87.5	84.8
SD	±12.4	±11.2	±11.9	±12.6	±9.7	±11.7
Inadequate WHR						
Men: ≥ 0.95		3 (17.6)	27 (57.4)		3 (17.6)	17 (36.2)
Women: ≥ 0.80	24 (80.0)			14 (46.7)		
Mean	0.85	0.87	0.85	0.82	0.87	0.84
SD	±0.10	±0.08	±0.09	±0.10	±0.07	±0.09

BMI: body mass index; WC: waist circumference; WHR: waist-to-hip ratio; SD: standard deviation; n: sample size; %: sample percentage. Reference values according to the World Health Organization (2000) and Pereira, Sichieri and Marins (1999)[21].

The lipid and glycemic values were pretty much the same one year after admission, except for HDLc, which presented a mean of 41 mg/dl in 2015 and rose to 64 mg/dl in 2016. In addition, the high frequency of female students with HDLc below the recommended values should be highlighted.

In all, 47% (n=22) of the students, regardless of gender, reported unhealthy eating habits either at university admission or one year after. On the other hand, sugar and fat intake decreased 4% (n=2) and 19% (n=9) respectively while sodium intake remained the same and sweet intake increased 19% (n=9).

One year after admission, the prevalence of regular physical activity increased, especially among men. In 2015, 66% (n=31) of the students declared to be physically active, but only 43% (n=20) did regular physical activity for 150 minutes or more a week. One year after admission, the frequency of self-reported assets rose to 75% (n=35) and the rate of physical activity

for 150 minutes or more a week rose to 47% (n=22). Bodybuilding is one of the modalities mostly cited by physically active students.

The use of tobacco and alcohol rose one year after admission among men and women. The rate of tobacco use was 21% (n=10) in 2015 and it increased 11% (n=5) in 2016. The rate of alcohol use, which was 77% (n=36), increased 6% (n=3). The illicit drug use prevalence rate, which was 30% (n=14) in 2015, increased 8% (n=4).

The frequency of students who reported stress, depressed mood, and anxiety decreased 4% (n=2), 6% (n=3) and 15% (n=7), respectively, one year after admission. There was a reduction in the prevalence of stress, depressed mood and anxiety among female students from 2015 to 2016, while among men only depressed mood and anxiety decreased, as shown in Table IV.

Table IV - Behavioral factors of university students stratified by year and gender. Ituiutaba, Minas Gerais, Brazil, 2016.

Behavioral factors		2015			2016		
		Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)	Women (n=30) n (%)	Men (n=17) n (%)	Total (n=47) n (%)
Stress		22 (73)	10 (59)	32 (68)	19 (63)	11 (65)	30 (64)
	Low	9 (41)	3 (30)	12 (38)	14 (74)	6 (55)	20 (67)
	High	10 (45)	6 (60)	16 (50)	4 (21)	3 (27)	7 (23)
	Very high	3 (14)	1 (10)	4 (12)	1 (5)	2 (18)	3 (10)
Depressed mood		12 (40)	7 (41)	19 (40)	10 (33)	6 (35)	16 (34)
	Low	9 (75)	4 (57)	13 (68)	5 (50)	2 (33)	7 (44)
	High	3 (25)	1 (14)	4 (21)	5 (50)	4 (67)	9 (56)
	Very high	0 (0)	2 (29)	2 (11)	0 (0)	0 (0)	0 (0)
Anxiety		28 (93)	16 (94)	44 (94)	26 (87)	11 (65)	37 (79)
	Low	8 (29)	4 (25)	12 (27)	11 (42)	2 (18)	13 (35)
	High	10 (36)	7 (44)	17 (39)	8 (31)	7 (64)	15 (41)
	Very high	10 (36)	5 (31)	15 (34)	7 (27)	2 (18)	9 (24)

n: sample size; %: sample percentage.

Sleep quality significantly improved one year after admission. Poor sleep quality was present in 73% (n=33) of the students, with the highest prevalence rate among men, but decreased to 38% (n=19). The rate of good sleep quality rose from 15% (n=7) to 47% (n=21). In contrast, the frequency of students with sleep disturbances increased 4% (n=2), with the highest prevalence rate among women. In 2016, there were no differences in sleep quality between men and women.

The percentage of family history of SAH, DM and obesity increased one year after admission – 11% (n=5) for SAH, 4% (n=2) for DM, and 2% (n=1) for obesity.

The analysis of the main risk factors for NCDs in both genders showed that women presented increased rates of unhealthy eating habits, smoking, alcohol consumption and frequency of family history of diabetes, hypertension and obesity one year after admission. On the other hand, men presented increased rates of smoking and stress one year after admission (Table V).

Table V - Prevalence of risk factors for NCDs among university students stratified by year and gender, Ituiutaba, Minas Gerais, Brazil, 2016.

	Women		Men	
Risk factors	**2015 (%)**	**2016 (%)**	**2015 (%)**	**2016 (%)**
Unhealthy eating	47	50	47	41
Sedentary lifestyle	60	53	53	47
Smoking	10	23	41	47
Drinking	63	73	100	100
Sleep disturbances	82	54	88	53
Family history				
Diabetes mellitus	53	67	59	47
Hypertension	57	77	77	71
Obesity	67	73	59	53
Stress	73	63	59	65
Depressed mood	40	33	41	35
Anxiety	93	87	94	65

DISCUSSION

The predominance of women and Whites in the present study is in agreement with data from the Anísio Teixeira National Institute of Educational Studies and Research (*Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira – INEP*) [25,26]. The predominance of students aged 18-19 years is also found in another study carried out with the same population type[27].

Knowledge about the consequences of unbalanced blood pressure can be very important for its control and health promotion, as reported in the Strategic Action Plan for Tackling Noncommunicable Diseases in Brazil[5]. One year after admission and after participating in educational and extension lectures and events, the students analysed in the present study presented a significant improvement in mean systemic blood pressure. The reduction in central obesity, identified through WC and WHR measures, may have influenced the decrease of female BP in the present study, since there is good evidence that central obesity influences the development of hypertension and other diseases of the metabolic syndrome[22].

Anthropometric parameters are good predictors of health, indicating risks of comorbidities. For example, individuals with a BMI that indicates underweight and with normal weight have low and medium risk of comorbidities while individuals classified as pre-obese and class I, II and III obese have increased moderate, high and very high risk, respectively[22]. However, parameters such as BMI, WC and WHR should not be assessed separately, since they present limitations that can only be overcome when they are analyzed together[28].

Regular physical activity can cause significant improvements in the lipid profile of adults[29]. This was observed in the present study, in which HDLc levels and regular physical activity improved significantly over the course of a year. In contrast, another study with university students[30] found that one year after admission the prevalence of regular physical activity increased, especially among men. The implementation of the university gym on the campus may have contributed to the reduction of sedentarism, since bodybuilding is one of the most cited modalities among physically active students.

It is estimated that physical inactivity increases between the chances of mortality by 20% to 30%. Of the 58,772 deaths worldwide in 2004, 5% were associated with physical inactivity among men and 6% among women[31]. Despite the considerable increase in the prevalence of physical activity among university students, many women in the present study did not do any type of sports.

The data on tobacco and alcohol consumption in the present study are similar to those found in another study with university students[32]; however, when compared with the Brazilian population above 18 years of age, tobacco consumption was three times higher and alcohol consumption increased fourfold. In the present study, the prevalence of use of both licit drugs among men corroborates data on the Brazilian population[33]. As for the use of illicit drugs, a similar study carried out with university students has shown that approximately 20% of the students use marijuana and about 10% use inhalants[32].

Family history is another indicator of chronic diseases and is considered even more relevant than biochemical analysis because biochemical indicators in young populations may not yet be good predictors of diseases such as hypertension, DM and dyslipidemias, as opposed to family history, which is an early indicator of these diseases[33].

Considering cardiovascular diseases, for example, family history may suggest a 40% increase in the risk for siblings and 60% to 75% increase in the risk for descendants of parents with premature disease[34]. The increase in the prevalence of

family history among university students in the present research corroborates data on the increase in the prevalence of NCDs worldwide[4], which emphasizes the importance of planning actions to reduce the prevalence of modifiable risk factors.

The changes in the life of the university student after university admission are closely related to cases of anxiety, depressed mood and stress, which can cause, associated with factors such as poor quality of sleep, a decrease in academic performance[35]. Sleep deprivation at this phase of life may lead to adaptive behavioral changes that can, if persistent, lead to the development of psychopathologies[36].

One year after admission there was a general improvement in the quality of sleep among the students analyzed in the present study, which may be due to an adaptation to the academic routine and a study plan. The improvement is reflected in the lower prevalence of stress, depressed mood and anxiety, demonstrating the relationship between them. The prevalence of poor sleep quality was low when compared with a study with students from Ceará[37].

It should be noted that the data related to diet, physical activity, family history, behavioral factors and the use of licit and illicit drugs were collected through a self-administered questionnaire in the present research. In addition, it is important to note that data were collected at different times of the academic semester. It is also important to develop measures to reduce the prevalence of alcohol, tobacco and illicit drug use, since this population is still a risk group.

CONCLUSION

Considering the results found one year after university admission, there was a decrease in the frequency of risk factors for non-communicable diseases in the study population. The increase in the prevalence of regular physical activity is an important contributor to changes in blood pressure, waist circumference, waist-to-hip ratio, high density cholesterol fraction and sleep quality and also interferes with behavioral factors such as stress, depressed mood and anxiety.

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